

WHAT IS CLAIMED IS:

1. A liquid crystal display apparatus comprising:

a first substrate having on one surface thereof a plurality of pixel electrodes for driving a liquid crystal, a plurality of driving devices so arranged as to correspond to the pixel electrodes, respectively, for controlling a potential of the pixel electrodes, and wiring electrically connected to the driving devices ;

a second substrate so arranged as to oppose the first substrate while facing the one surface of the first substrate having the pixel electrodes thereon; and

a liquid crystal layer formed by injecting the liquid crystal between the first and second substrates,

wherein the first substrate has a non-display portion in which the driving devices and the wiring are disposed and which is not used for display and a display portion which is a portion other than the non-display portion and is used for display, and the second substrate has a transparent layer disposed on at least a portion of a surface thereof which surface faces the first substrate , the portion corresponding to the display portion out of the display portion and the non-display portion.

2. The liquid crystal display apparatus of claim 1,

wherein a thickness t_1 of the liquid crystal layer of at least a part of the non-display portion is 0.48 times or more of a thickness t_2 of the liquid crystal layer of the display portion ($t_1 \geq 0.48t_2$).

3. The liquid crystal display apparatus of claim 1, wherein the transparent layer is formed of a resin.

4. The liquid crystal display apparatus of claim 1, wherein the second substrate further has a shading film on a portion of the surface thereof facing the first substrate which portion corresponds to the non-display portion of the first substrate.

5. The liquid crystal display apparatus of claim 1, wherein the transparent layer is disposed in portions of the surface of the second substrate facing the first substrate which portions corresponds to the display portion and the non-display portion, respectively, and the thickness d_1 of the transparent layer disposed on at least a part of the portion corresponding to the non-display portion is smaller than the thickness d_2 of the transparent layer on the portion corresponding to the display portion ($d_1 < d_2$).

6. The liquid crystal display apparatus of claim 1,
wherein the transparent layer is not disposed in at least a part of the portion corresponding to the non-display portion.

7. The liquid crystal display apparatus of claim 4,
wherein the transparent layer is not disposed in at least a part of the portion corresponding to the non-display portion, and the difference Δd ($\Delta d = d_2 - s$) of the thickness d_2 of the transparent layer of the portion corresponding to the display portion and the thickness s of the shading film satisfies the following formula when the thickness of the driving device is 0.2 to 0.4 μm , the thickness t_2 of the liquid crystal layer of the display portion is 1.0 to 5.0 μm and the thickness s of the shading film is 0.5 to 2.0 μm .

$$-1.5 \mu\text{m} < \Delta d \leq 2.4 \mu\text{m} \quad \dots (1)$$

8. The liquid crystal display apparatus of claim 7,
wherein the difference Δd ($\Delta d = d_2 - s$) satisfies the following formula (2):

$$0 \mu\text{m} \leq \Delta d \leq 1.0 \mu\text{m} \quad \dots (2)$$

9. The liquid crystal display apparatus of claim 4,
wherein the plurality of pixel electrodes are arranged

in matrix with predetermined gaps thereamong to constitute a pixel electrode matrix,

two adjacent rows of the pixel electrode matrix are arranged in such a fashion that the arrangement cycles (B) defined by the plurality of pixel electrodes arranged in a row direction are mutually coincident,

two adjacent columns of the pixel electrode matrix are arranged in such a fashion that the arrangement cycles (A) defined by the plurality of pixel electrodes arranged in a column direction are mutually coincident, and

the shading films are arranged at positions between the columns of the pixel electrode matrix in such a fashion as to extend in a direction parallel to the column direction of the pixel electrode matrix.

10. The liquid crystal display apparatus of claim 4,

wherein the plurality of pixel electrodes are arranged in matrix with predetermined gaps thereamong to constitute a pixel electrode matrix,

two adjacent rows of the pixel electrode matrix are arranged in such a fashion that the arrangement cycles (B) defined by the plurality of pixel electrodes arranged in a row direction are mutually coincident,

two adjacent columns of the pixel electrode matrix are

arranged in such a fashion that the arrangement cycles (A) defined by the plurality of pixel electrodes arranged in a column direction are mutually coincident, and

the shading films are arranged at positions between the rows of the pixel electrode matrix in such a fashion as to extend in a direction parallel to the row direction of the pixel electrode matrix, and are arranged at positions between the columns of the pixel electrode matrix in such a fashion as to extend in a direction parallel to the column direction of the pixel electrode matrix.

11. The liquid crystal display apparatus of claim 4, wherein the plurality of pixel electrodes are arranged in matrix with predetermined gaps thereamong to constitute a pixel electrode matrix,

two adjacent rows of the pixel electrode matrix are arranged in such a fashion that the arrangement cycles (B) defined by the plurality of pixel electrodes arranged in a row direction mutually deviate by about a half cycle,

two adjacent columns of the pixel electrode matrix are arranged in such a fashion that the arrangement cycles (A) defined by the plurality of pixel electrodes arranged in a column direction are mutually coincident, and

the shading films are arranged at positions between the

rows of the pixel electrode matrix in such a fashion as to extend in a direction parallel to the row direction of the pixel electrode matrix, and are arranged at positions between the columns of the pixel electrode matrix in such a fashion as to extend along the column direction of the pixel electrode matrix.

12. The liquid crystal display apparatus of claim 1, wherein the transparent layer has a mean transmission factor of at least 80% in a visible ray region.

13. The liquid crystal display apparatus of claim 1, wherein the thickness of the transparent layer is 2.0 μm or below.

14. A method for producing a liquid crystal display apparatus comprising the steps of:

preparing a first substrate on one surface of which are formed a plurality of pixel electrodes for driving a liquid crystal, a plurality of driving devices so disposed as to correspond to the pixel electrodes, respectively, for controlling a potential of the pixel electrodes, and wiring electrically connected to the driving devices, on one surface of a first substrate;

preparing a second substrate as another substrate, and forming a transparent layer on at least a portion of one surface of the second substrate corresponding to a predetermined portion to be a display portion of the first substrate;

bonding the first substrate and the second substrate so as to oppose the one surface of the first substrate having the pixel electrodes formed thereon and the one surface of the second substrate having the transparent layer formed thereon with a predetermined gap therebetween; and

forming a liquid crystal layer by injecting a liquid crystal between the first substrate and the second substrate.

15. The method for producing a liquid crystal display apparatus of claim 14,

the method further comprising a step of:

forming a shading film on a portion of one surface of the second substrate corresponding to a predetermined portion to be the non-display portion of the first substrate, before the transparent layer is formed on at least the portion of the one surface of the second substrate corresponding to the predetermined portion to be the display portion.

16. The method for producing a liquid crystal display apparatus of claim 14,

wherein the step of forming the transparent layer on at least the portion of the one surface of the second substrate corresponding to the predetermined portion to be the display portion includes the steps of:

forming a photo-curable transparent resin layer by use of a transparent resin having a property of curing at a portion thereof irradiated with light on the one surface of the second substrate,

irradiating light to the photo-curable transparent resin layer on at least the portion corresponding to the predetermined portion to be the display portion, and

developing the photo-curable transparent resin layer.

17. The method for producing a liquid crystal display apparatus of claim 14,

wherein the step of forming the transparent layer on the portion of the one surface of the second substrate corresponding to the predetermined portion to be the display portion includes the steps of:

forming a light decomposable transparent resin layer by use of a transparent resin having such a property of decomposition that a portion irradiated with light is decomposed, on the one surface of the second substrate ,

irradiating light to the light decomposable

transparent resin layer in other portions than the portion corresponding to the predetermined portion to be the display portion, and

developing the light decomposable transparent resin layer.

18. The method for producing a liquid crystal display apparatus of claim 14,

wherein the step of forming the transparent layer on at least the portion of the one surface of the second substrate corresponding to the predetermined portion to be the display portion includes the steps of:

forming a transparent resin layer from a transparent resin on the one surface of the second substrate,

forming a resist layer on the surface of the transparent resin layer,

applying exposure to the resist layer so that solubility of the resist layer in at least the portion of the one surface of the second substrate corresponding to the predetermined portion to be the display portion to a developing agent is lower than those in portions other than the portion corresponding to the predetermined portion,

developing the resist layer, and

removing the transparent resin layer at the position

at which the resist layer is removed.

19. The method for producing a liquid crystal display apparatus of claim 14,

wherein the step of forming the transparent layer on the portion of the one surface of the second substrate corresponding to the predetermined portion to be the display portion includes the steps of:

forming a resist layer on the one surface of the second substrate,

applying exposure to the resist layer so that solubility of the resist layer in at least the portion corresponding to the predetermined portion to be the display portion to a developing agent is higher than those in portions other than the portion corresponding to the predetermined portion,

developing the resist layer,

forming a transparent resin layer from a transparent resin in such a fashion as to cover the surface of the second substrate from which the resist layer is removed and the surface of the resist layer, and

removing the resist layer and the transparent resin layer formed on the surface of the resist layer by use of a peeling solution.